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Topics

Nuclear Weapons, Effects of Nuclear Weapons,
Capabilities of Nuclear Weapons, EM-1, DNA EM 1
manuals_various; manuals; additional_collections
English

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Philip J. Dolan (Editor), Capabilities of Nuclear Weapons, Stanford Research Institute, Defense Nuclear Agency Effects Manual 1, DNA EM 1, 1972, with page updates Change 1 (1978) and Change 2 (1981). Declassified in 1989 with some deletions. Note that this is Part 1, Phenomenology, 835 pages. There is a separate Part 2, Damage Criteria, which gives data on damage and effects caused by the various phenomena. This manual was first issued in July 1951 as TM 23-200, Capabilities of Atomic Weapons. It was renamed Capabilities of Nuclear Weapons in 1964. The current version is 22 volumes long (Harold L. Brode's 1992 edition), with a separate volume for each chapter. A condensed summary of declassified data was issued in 1996: John A. Northrop's Handbook of Nuclear Weapon Effects : Calculational Tools Abstracted from EM-1. Revisions continue. Discussion: <http://glasstone.blogspot.co.uk/> See also: The effects of the atomic bomb on Hiroshima, Japan (the secret U.S. Strategic Bombing Survey report 92, Pacific Theatre) located at: <http://archive.org/details/TheEffectsOfTheAtomicBombOnHiroshima>

The EM-1 manual's limitations are discussed at <https://www.nukegate.org/> In particular, it was recognised by John von Neumann and others during the Manhattan Project that the act of doing work on a city absorbs blast energy, and Penney later proved this to be the case in both Hiroshima and Nagasaki by measuring the reduction in peak overpressure (from damage done by crushed petrol cans, etc) compared to British nuclear tests on unobstructed terrain at Maralinga (Penney et al., 1970). The energy absorbed from both the overpressure and dynamic pressure loading of a blast wave in pushing (i.e. oscillating in the elastic range) and/or damaging buildings (i.e. the larger soak up of energy in the bigger plastic deformation range, particularly for ductile buildings with steel frames or reinforced concrete) is readily calculated since a deflection of a building's centre of mass by "x" metres requires energy $E = Fx = PAx$, where P = pressure and A = area. The Northrop 1996 book gives the required data for calculating this energy for a range of buildings on pages 521-5, e.g. Figure 15.7 (where energy absorbed is proportional to the area under the load-ductility ratio "curve") and Table 15.6 (giving oscillation periods, static yield resistance pressures, and ductility ratios for damage for 15 kinds of building). The maximum deflection of a building at a particular distance is calculated from the equation 6.105.1 on page 283 of the 1957 edition of Glasstone's Effects of Nuclear Weapons (not present in later editions!), or from Bridgman's 2001 Introduction to the physics of nuclear weapons effects (DTRA limited edition). Whereas Northrop's 1996 EM-1 Fig. 15.20 shows that a multistorey reinforced concrete building is 50% likely to collapse at 2.7 km ground range from a 1 megaton surface burst (on unobstructed desert terrain), this range could be reduced massively in a real city where intervening buildings absorb most of the blast and radiation (a fact ignored in Western nuclear test data analysis such as Glasstone and EM-1).

EM-1 is therefore more applicable to military targets in open terrain than civilian cities, although it does contain some corrections for shielding in typical real terrain. For example, Northrop's 1996 EM-1 Fig. 16.18 shows thermal exposures in a 1 metre high wheat stand, 4 km from a 550 kt burst at 400 metres altitude: the "theoretical" (Glasstone and Dolan type) free-field thermal exposure is 40 cal/cm², but this falls to just 0.2 cal/cm² at ground level, showing a shielding effect. A city skyline is even more effective at this sort of shielding, and Figs. 16.16 and 16.17 shows that forests also provide significant shadowing for wide angles, unless the burst is directly overhead. For example, for 1,100 trees/acre of spruce trees there is zero exposure if the fireball's elevation angle above the horizon is 20 degrees or less! Under such conditions, dry leaf litter on the forest floor will not burn regardless of the "free field" exposure calculated from unobstructed line-of-sight assumptions by Glasstone and Dolan! This shadowing problem has obvious

major implications for both "firestorm" and "nuclear winter" (firestorm soot cloud) anti-nuclear propaganda efforts used to justify our disarmament.

Evidence of such resistance of forests to nuclear weapons thermal radiation is in Figs. 6.24a and 6.24b in Glasstone's 1957 Effects of Nuclear Weapons (photos removed from later editions, but identified in the declassified film Military Effects Studies on Operation Castle, as well as Fons and Storey's report Operation Castle, project 3.3, blast effects on tree stand, Figs. 3.2 and 3.8): the former shows the unburned forest stand at 9,300 ft from ground zero on Uncle Island, Bikini Atoll, for 110 kt Castle-Koon in 1954 after 3.8 psi peak overpressure, and the latter shows the unburned forest stand at 62,500 ft from ground zero on Victor Island, Bikini Atoll, for 14.8 Mt Castle-Bravo in 1954 after 2.4 psi peak overpressure. Some blast damage occurred to the trees, but there was no fire. Real world shadowing, and realistic 50-80% humidity of most targets near water (such as most coastal cities, or cities beside large lakes or rivers like Detroit and London), reduces ignition risks contrary to data from low-humidity Nevada tests such as Encore in 1953 (19% humidity!).

Secrecy classification and limited distribution versus the need for widespread understanding of the facts affecting national security in order for democracy to function, and also in order to allow a wide base of critical review and feedback to eliminate errors and misunderstanding which do often proliferate through closed-door groupthink "established wisdom Bible" bias:

(1) The USA disarmed all of its dedicated tactical W79 neutron bombs in 1992, but as a CIA report and more recent data on the history of 1960s Russian nuclear isentropic compression systems prove (a system developed and successfully tested in four shots of Operation Dominic by Livermore lab., USA in 1962, but then discarded), in this archive page compendium shows, Russia has thousands of neutron bombs. The 1996 Northrop EM-1 data on two yield ranges of neutron bomb output and neutron induced activity in European soil is therefore NOT giving away USA weapons effects data (USA doesn't have these weapons anymore!!), but rather RUSSIAN weapons effects data, purely of use for Western civil defense if and when Russia uses its tactical nuclear weapons to "defend" seized European territories! There is ZERO justification for keeping this data secret.

Likewise for EMP threats from Russia. Russia tested such bombs in 1962 with full scale 1000km power line exposure, but WE DID NOT DO THIS IN OUR TESTS, which provided less data because many instruments were mis-calibrated due to a failure in theoretical understanding in 1962. Russia published their data for North Korea, Iran, et al., to use. It is no use trying to limit taxpayer funded Western nuclear effects data from being used to help safeguard the West from Russia. THAT IS ACTUALLY PRO-TERRORISM, NO MATTER WHAT PRO-RUSSIAN "ARMS CONTROLLERS" RANT. It's as pathetic as supporting unilateral nuclear disarmament with faked open terrain blast and radiation data for use for cities in the disapproved delusion that such tactics improve, rather than degenerate, our security.

(2) The examples above demonstrate blast and thermal radiation exaggeration problems for nuclear deterrence. The Russians, Chinese, and several other countries have conducted atmospheric tests and have their own sources of nuclear effects data. In addition, as the documents stored in this archive page demonstrate, the originally secret Western fallout patterns compendium, DASA-1251 (nuclear test fallout data from USA, UK, and French shots), contained one "GOOD" (but actually FALSE) land surface burst fallout for the typical yield range of modern MIRV warheads: the 110 kt Castle-Koon shot (the fallout went over most of Bikini Atoll, being fired on an island at the south of the Atoll when the wind was blowing generally towards the north, over islands and barges in the lagoon).

This SECRET error was then used to falsely "justify" many fallout models, such as SIMFIC, in limited distribution reports which nobody could see let alone debunk! After it was declassified, we found a serious

error, exposed at nukegate.org in 2006: it massively exaggerates the actual fallout. The original error comes from the poorly checked source document, Operation Castle's weapon test report WT-915, which contains huge errors in the distance scale of Bikini Atoll for the Castle series, and which was simply copied into DASA-1251 in the 1960s without being checked or corrected! This kind of mistake could exist elsewhere, where somebody makes an original mistake which is then copied and used to "prove" something that is totally false in nuclear deterrent capabilities. We need openness or we are living in a dictatorship that might as well be ruled by some Stalinist shoot-the-messenger state.

(3) Yet another example of the groupthink delusion is Western single-primary warhead nonsense (debunked at nukegate.org): Russian double-primary nuclear weapons development and their implications for modern Russian neutron bombs (i.e. low yield cleaner bombs for "peaceful uses" like deterring invasions, or deterring legal re-occupations of illegally seized territory) have been declassified by Russia. We have placed a summary of this data on this archive compendium, taken from nukegate.org analysis of translated original Russian nuclear lab films, reports and declassified documentation. The older single primary designs used in the West dating from an original test in late 1952 require a tritium and deuterium gas capsule in the secondary stage if the total yield is very low, making them expensive and in need of regular tritium replacement (half disappears by radioactive decay each 12.3 years!).

Trutnev's double-primary, double-approach Russian system, which didn't need foam to slow and disperse x-rays into "shadows" on the far side of the secondary, was first tested 23 February 1958, has obvious much better isotropy and so doesn't require the Western channel foam filler. Foam in UK and USA designs was used for x-ray diffusion to make a spherical secondary isotropically exposed to x-rays for compression (this problem was why Teller only used axial compression in the original foamless Teller-Ulam based Mike device of 1952 and other sausage or cylindrical secondary devices). It turned out that America peremptorily discarded such ideas (despite the original 1951 Teller-Ulam paper suggesting that more than one primary stage may be used!), and has always used only a single primary for groupthink delusion reasons, never even testing the Russian idea. But the double-approach makes it far more efficient on a yield-to-mass basis at compressing the secondary, thus cheapening and cleaning up the secondary design because you get better compression and don't need oralloy or tritium-deuterium boosting. Russian information suggests that with the dual approach (two primaries, one each side of the secondary) and isentropic compression (using a foam coating on the secondary stage, etc.), it is possible to obtain compressed gaseous deuterium fusion without tritium, something impossible with the smaller compressions of heavy oralloy secondary shock compression systems because the D+D fusion cross section is about 100 smaller than that for D+T.

Thus Trutnev's double primary system was more efficient at compression because it didn't need foam to slow and disperse x-rays into "shadows" on the far side of the secondary. So it was scaled down in the 1960s for cleaner low yield weapons, thus yielding enhanced neutron effects without needing tritium gas in the secondary stage (with the better compression in Trutnev designs, you can use a Li6D secondary even at low yield). Therefore, Western secrecy, even in weapon design, is a fallacy if the enemy is way ahead of you; then the secrecy stamp is just being used to dogmatically cover-up a scandal, and perpetuate your own expensive mistakes of ideology, which hardens into an orthodoxy of rigor-mortis.

For this very reason, Edward Teller was constantly complaining during the first Cold War that there was too much conformity in Western nuclear warhead design, that semi-empirical computer models based on one type (single primary) of design were being used to prevent the exploration of totally new ideas, etc: you can't get backing to test anything at extreme variance with "established wisdom". Every new Western design must be an incremental improvement on a previously validated Western design (because it must be evaluated using semi-empirical computer codes based on the single-primary framework of previous designs); thus, every "new" idea is limited perforce to containing the basic two-stage, single-primary assumption of previously tested designs as their basis. A "radical" design is one which changes the design of the primary or the secondary, but not one which changes the entire framework of design by introducing a sec-

ond primary stage! Dogma is self-perpetuating, as it is in the routine development of physical theories (where every new theory must contain the previously validated theory as a subset, rather than being completely radical in which the previous theory is shown to just be a approximation contrived to fit the data and extrapolate a little). Declassification won't allow Russia to do anything if they have tested better designs already, and they can't afford Western designs that contain exorbitant amounts of tritium and or alloy.

Correction to Dolan's 1972 DNA-EM-1 forest blowdown data: Northrop's page 617 (section 18-3 of EM-1), Table 18.1, footnote c states that DNA-EM-1's Chapter 15 mistakenly reported tree girth (i.e. π or ~ 3.14 multiplied by the mean diameter of the tree measured 1 m above the ground) as the diameter, for tree types IVa-1 and IVb. The corrected average diameters for tree types IVa-1 and IVb are 13 and 11 inches, respectively.

It's also worth noting that there's an improved model of the blast wave precursor in Northrop's 1996 book. Northrop gives a semi-empirical means of predicting blast wave precursor waveforms in "Section 2.2 Air blast over real (non-ideal) surfaces" (pages 54-68). Computer calculations (Figures 2.72 and 2.73) indicate that for tactical nuclear weapons of 10 and 100 kt yield (approximately the range of most Nevada nuclear tests with strong precursors, where the largest air burst was Plumbbob-Hood at 74 kt), the thermal energy absorbed by a desert causes a fully developed hot dust cloud precursor with twice the classical shock speed. If height of burst is scaled to 1 kt (by the cube-root of yield scaling), this maximum precursor blast effect occurs for a burst height of 75-100 metres, and at a ground range of 225 metres from ground zero (as scaled down to 1 kt), where the dynamic pressure impulse reaches 2.0 psi-seconds (again, as scaled down to 1 kt yield). Figures 2.83 and 2.84 summarize data for the parameters needed to construct precursor blast waveforms.

Selected relevant background reports have also been added in response to Russian nuclear threats to escalate its Ukraine invasion, which could result in "tests" or demonstration strikes at high altitude to cause EMP effects, or even low altitude air burst tactical nuclear weapons under cover of claiming Ukraine was responsible for attacking itself. Remember that Putin tried to blame the UK for the 2018 killing of Dawn Sturgess with Novichok, and Putin also denied the radioactive polonium 210 attack in London in 2006. Nuclear weapons launched by SLBM from submarines hidden in the ocean would not immediately disclose their origin, particularly if detonated at high altitude (although there is an AWE originated geomagnetic EMP unfold computer program - included in a report by John S. Malik uploaded within these documents - that allows a satellite EMP detector to be used to determine the gamma pulse of the weapon, which would fingerprint the weapon design from the relative sizes and rates of rise and fall of the primary and secondary stage gamma outputs, and the time delay for secondary stage ignition).

The West needs to be ready for Russian surprise tactics of their preferred Wang Jungze sort: "Deceive. Attack weak targets. Kill with a borrowed knife. Wait until the enemy tires of defense. Kick him when he is down. Use diversion tactics like noises in the East, when attacking from the West." Therefore, preparing only to deter an all-out nuclear attack ensures this enemy attempts to use other tactics, and it already has 2000+ dedicated tactical nuclear weapons, a vast tactical superiority.

Any future, openly-published, Glasstone and Dolan "Effects of Nuclear Weapons" or Northrop EM-1 edition should not only finally correct free-field blast and radiation effects for "concrete jungle" attenuation by a modern city, but should focus primary attention on the wide range of very different nuclear attacks, including tactical military attacks like a nuclear Pearl Harbor, or battlefield neutron defense, and the risk of high altitude EMP or anti-satellite attacks.

Keeping nuclear test data secret plays into the hands of those who wish to ignore or exaggerate certain kinds of attack for disarmament propaganda to aid an enemy, a problem that occurred in 1920s and 1930s

Britain when all-out gas war was falsely hyped as a certainty in future war. The popular media proved to be just as much a vehicle for gas war deceit and propaganda then as it is today with the nuclear war. It realises that most people don't want to think about it, so it joins the chorus in trying to shoot the messenger, to make key facts appear "unthinkable". In the past this approach led to the biggest world war in history, so it is deplorable that the same tactics are being used again. Only by credible deterrence of the kind of invasions that set off both world wars (the invasion of Belgium in 1914, of Poland in 1939) and military attacks like Pearl Harbor in 1941, can we prevent the escalation to world war. Retreating to Lord Noel Baker's February 1927 BBC radio propaganda lying that "all experts are agreed" that all-out gas war (or nuclear) necessitates disarmament, is a certain road to another world war.

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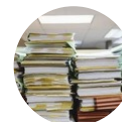
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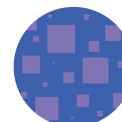
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